The Modern Hearing Aid – an Extreme System Integration Challenge

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Abstract

People with reduced hearing generally want to hide this disability and thus the size of hearing aids is constantly decreasing in the effort to make them virtually invisible. However, as for all other modern electrical devices more and more features are constantly added to hearing aids driven by the development in modern IC technology. This has resulted in the modern hearing aid being highly advanced devices where the demands for performance and features at very low supply voltage and power consumption constantly prove a huge challenge to the physical design of hearing aids and not at least the design of the ICs for these. This leads to very large demands for system integration at the packing level, SiP (System-in-Package), and not at least at the IC level, SoC (System-on-Chip). As a result of this all large hearing aid manufactures use custom package technology which again uses fully customized ASICs (Application Specific Integrated Circuit) to produce a competitive advantage in terms of size and features. This presentation will give a brief insight into the hearing aid market and industry and a brief view of the historic development of hearing aids. The system integration challenge will be illustrated by showing how a modern hearing is constructed identifying amplifier as the key component in the modern hearing aid. The size of the amplifier is critical for the size of the final hearing aid and a study of the size of these for different manufactures will be presented. Designing the ICs for hearing aids poses many challenges and is a constant compromise between size, power consumption and performance of the individual blocks and some of these will be highlighted in the presentation. Finally, the future perspective for ICs for hearing aids will be discussed.